

NTSC

Digital BETACAM

DVW-A510

Component Digital Videocassette Player



The development of the Betacam® format in 1982 made possible the introduction of compact camcorders which had a revolutionary effect on ENG operations. In 1987, Betacam SP® was introduced. Based on metal particle tape, its improved picture quality extended the use of the format to post production and transmission applications. With their outstanding performance, production flexibility and reliability, Betacam VTRs soon established the format as a de facto standard throughout the broadcast industry.

Sony was also beginning a major research and development program into digital video technology, a program which led to the introduction of the world's first D-1 component digital VTR and more recently to a wide range of CCIR 601 based products, with Serial Digital Interface (SDI), for emerging full component digital operations.

To provide a smooth transition from existing analog operations to those based on this digital technology, Sony has now developed the DVW-A510 Player, one of a range of Digital BETACAM™ component digital VTRs. They inherit the Betacam concept of an affordable workhorse format but add many new advantages made possible by the introduction of innovative technologies.

The DVW-A510 provides the superb picture quality of component digital recording in a compact VTR with cassette tapes which are the same size as those of analog Betacam machines. Furthermore, the DVW-A510 has the evolutionary benefit of reverse compatibility to play back analog Betacam and Betacam SP tapes.

Integrating this digital technology into the post production process at the same time as providing compatibility with existing component analog camcorders and tape archives, gives users a significant return on their investment. The DVW-A510 provides real advantages, with outstanding performance and a whole range of new functions to satisfy the future needs of the television industry and other users.



Features

Excellent Picture and Sound Quality

Superb Picture Quality

The DVW-A510 uses the Digital BETACAM component digital recording format which provides superb picture quality and multi-generation capability to overcome the limitations of analog recording. This technique provides much greater operational flexibility, for example by minimizing dubbing limitations to allow more efficient and complex multi-layering and editing. Because it meets the CCIR 601 standard, the Digital BETACAM format is also suitable for emerging 16:9 wide-screen operations.

High Quality Digital Audio

The DVW-A510 provides four 20-bit digital audio signal channels. To ensure a wide dynamic range for analog audio signals, a super linear D/A converter is used in the DVW-A510 to achieve the required high resolution.

Long Playback Time

To gain maximum performance from high density digital recording, new metal particle cassette tapes have been developed exclusively for Digital BETACAM VTRs. To cover different applications, both large and small size cassettes are available and these have the same dimensions as current Betacam cassettes.

The use of this highly efficient data handling regime achieves a longer playback time than that of the current Betacam format. A large cassette provides a maximum playback time of 124 minutes and a small cassette up to 40 minutes.



Versatility for Current System Environments

Betacam SP Playback Capability

The DVW-A510 has the capability to play back tapes which are recorded in the current Betacam and Betacam SP (Oxide/Metal tape) formats. Dedicated playback heads and a signal processor for analog playback make this possible without compromising performance. This compatibility is a major benefit for users, who can utilize existing tape archives and take advantage of digital technology at the same time. It also enables existing Betacam SP camcorders to be used for acquisition. So a current system can be upgraded from analog to digital step by step or all at once.

Compact and Lightweight

With the development of an efficient data handling system and application-specific LSIs for signal processing and system control, the DVW-A510 is compact and lightweight.

It has the same dimensions as current

Betacam SP

studio

models, so it

can replace them without any

modification to

existing system

configurations. In

addition, its weight of

approximately 34 kg

(75 lb) is comparable to

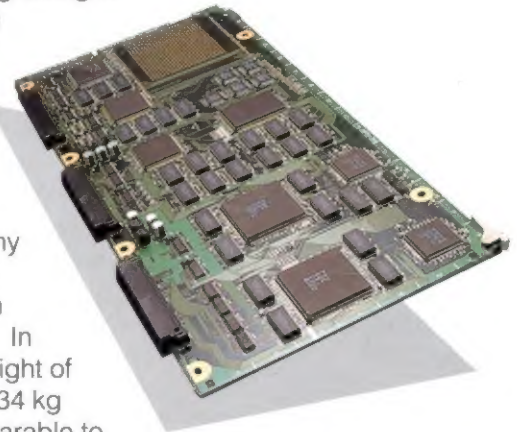
current Betacam SP studio VTRs. The use of LSIs also

contributes to a low power consumption of 175W.

This compact, light weight and low power consuming

unit is highly practical, particularly in a limited space

environment such as inside an OB van.



Versatile Integration into Current Analog Systems

The DVW-A510 has been specifically designed for easy integration into existing analog systems. Built-in D/A converters for both audio and video signals allow direct interfacing with analog equipment. In addition to analog component interfaces, analog composite



BVC-400A

output ports are incorporated to provide a direct link with existing NTSC systems. Physical dimensions that are identical to those of Betacam SP VTRs and cassettes also mean that Sony Library Management

System™ (LMS) and Flexicart® multicassette systems can be easily



DVW-CA510

Serial Digital Interface

The DVW-A510 is equipped with SDI (Serial Digital Interface) which conforms to the SMPTE259M. A 4:2:2 component digital video signal, together with four digital audio channels and time code are carried via a single coaxial cable, allowing simple connection with other SDI equipped devices—including Sony DVS Series switchers.

Furthermore, SDI also gives the benefit of long distance transmission—at least 200 meters without any extra hardware.

Comprehensive Editing Features

Digital Jog Sound

Complete reproduction of four channels of digital audio is achieved within the range of -1 to +1 times normal playback speed, even in the Jog mode. This feature is helpful in quickly and precisely establishing an editing point while monitoring the digital audio signals, which remain in absolute sync with the pictures.

High Speed Picture Search

Recognizable color pictures are provided in shuttle mode at speeds up to approx. ± 50 times normal playback. In addition, recognizable digital audio playback is also provided up to approx. ± 24 times normal playback speed. These capabilities allow the desired picture to be rapidly located.

Two-way Dial Operation

The DVW-A510 features two alternative ways of selecting the Jog and Shuttle modes. For users familiar with current Betacam VTR operation, pressing the search dial switches between these two modes. Additionally, Jog, Shuttle and VAR buttons are located just above the search dial, so that the operator also has push-button mode selection in the same manner as Sony BVH Series 1-inch VTRs and D-1/D-2 DVR Series VTRs.

Dynamic Tracking™ Playback

A DT playback capability provides broadcast quality pictures over the range of -1 to +3 times normal playback speed. Dedicated analog DT heads also provide playback of analog signals from Betacam tapes over the same DT speed range.



DVW-A510

Dynamic Motion Control (DMC) Playback

The DVW-A510 also provides a DMC playback capability, memorizing the tape speed trajectory over the DT speed range (-1 to +3 times normal speed).

Program Play

The DVW-A510 has a Program Play mode which allows video recordings to be reproduced over a range of $\pm 15\%$ normal speed, in increments of 0.1%. With the BKDW-507 optional Audio Program Play board installed, the four digital audio signals can also be compressed or extended (with correct pitch) along with the video signal. This useful feature allows the duration of a program to be extended or shortened so that it will fit into an allocated time period.

Adjustment Free Operation

Automatic Alignment Systems

The DVW-A510 is fitted with Automatic Alignment Systems to ensure the accurate reproduction of digital data. This includes an Automatic Equalizer which optimizes the gain and phase of the off-tape RF signal. With a powerful error correction and concealment capability, this automatic equalizer provides accurate reproduction of video and audio data ensuring stable picture and sound quality.

In addition to this auto RF equalizer, the alignment system also adjusts the servo systems to optimize tape tension, capstan frequency and drum phase, and DT performance after parts in the tape transport have been replaced.

These automatic systems eliminate the need for time consuming manual equalizer and servo system adjustments, ensuring stable and consistently high playback performance.

Sophisticated Mechanical Design

Reliable Tape Transport

The tape transport mechanisms of the DVW-A510 is designed for precision and robustness. It uses a mid rotary type scanner which is positioned between the upper and lower drums to obtain fine head-to-tape contact. Additionally, several dust-protection systems maintain the proper reproduction of digital data. This includes head cleaners for both



rotary and time code/cue audio heads, a tape cleaner and an enclosure to prevent air flow into the tape transport housing. With the use of powerful error correction and concealment systems, these dust-protection features maintain accurate data playback.

Easy Maintenance

A sophisticated diagnostic system advises of malfunctions within the VTR. When a fault occurs, an error message is provided on both the tape timer display and those video outputs which have a character superimposition facility. The precise location and nature of a fault can then be quickly determined before it becomes a major problem. In the DVW-A510, most of the circuits are arranged on plug-in boards to allow quick and easy maintenance. Additionally, the drum assembly has been primarily designed to achieve easy, low cost maintenance and simplify both mechanical and electric alignment after scanner replacement. This helps to drastically reduce the time taken for periodic scanner replacement and minimizes manual adjustments.



Easy Operation

Channel Condition Monitoring

The DVW-A510 has a three-color channel condition indicator, each color representing a particular error rate threshold level. Green indicates a good condition, yellow advises caution but operation can continue and red warns of a problem with either the tape or VTR. Details of the error rate of each channel can be observed through an RS-232C communication port, allowing the monitoring of multiple VTRs.

Built-in Signal Generator

A built-in signal generator is included to help system set-up and maintenance. This internal generator provides 16 test signals, including color bars, ramp, multiburst, black burst, etc. Tone is also provided for audio line-up.

Audio Monitoring

A matrix of push buttons is provided for audio monitoring switching. Each of the four playback channels (and the cue channel) can be switched to either the left or right monitor outputs. The audio level meters and the playback level controls for the four digital audio channels and the cue channel are located on the upper control panel.

Ease of Initial Set-up

Set-up parameters of the DVW-A510 can be set in its menu-style operation using the search dial. While a simple, single line, menu is provided on the tape timer display, a descriptive, multi-line menu is also superimposed on one of the analog composite and one of the serial digital outputs. In order to be able to set up VTRs quickly, the DVW-A510 is equipped with three user memories of set-up parameters. These memories are simply recalled with the set-up select switch and set-up parameters are instantly changed to the stored values. With the use of these set-up memories, a VTR can be immediately set up for a specific application.

Versatile System Interface

Digital Output

Serial digital video and audio

The DVW-A510 is equipped with SDI (Serial Digital Interface) which conforms to the SMPTE259M. SDI carries one digital video signal, four digital audio channels and time code through a single coaxial cable.

Serial digital audio

Digital audio output ports conform to AES/EBU format synchronized to video. The four channels of digital audio are coupled into pairs, CH1/CH2 and CH3/CH4.

Analog Output

Output ports for analog component video, four channels of analog audio and cue audio, together with analog composite video output ports are built

into the DVW-A510. They allow direct installation of these VTRs into analog systems without extra D/A converters.

Front control panel buttons select any combination of the four audio channels or cue audio to the monitoring outputs.

Remote

RS-422A

The DVW-A510 is equipped with RS-422A serial communication ports to interface with Sony VTRs and edit controllers.

RS-232C

For communication with various equipment such as personal computers, an RS-232C serial communication port is incorporated. Various parameters can be set up and monitored through this port allowing comprehensive monitoring of the entire system.

Parallel I/F

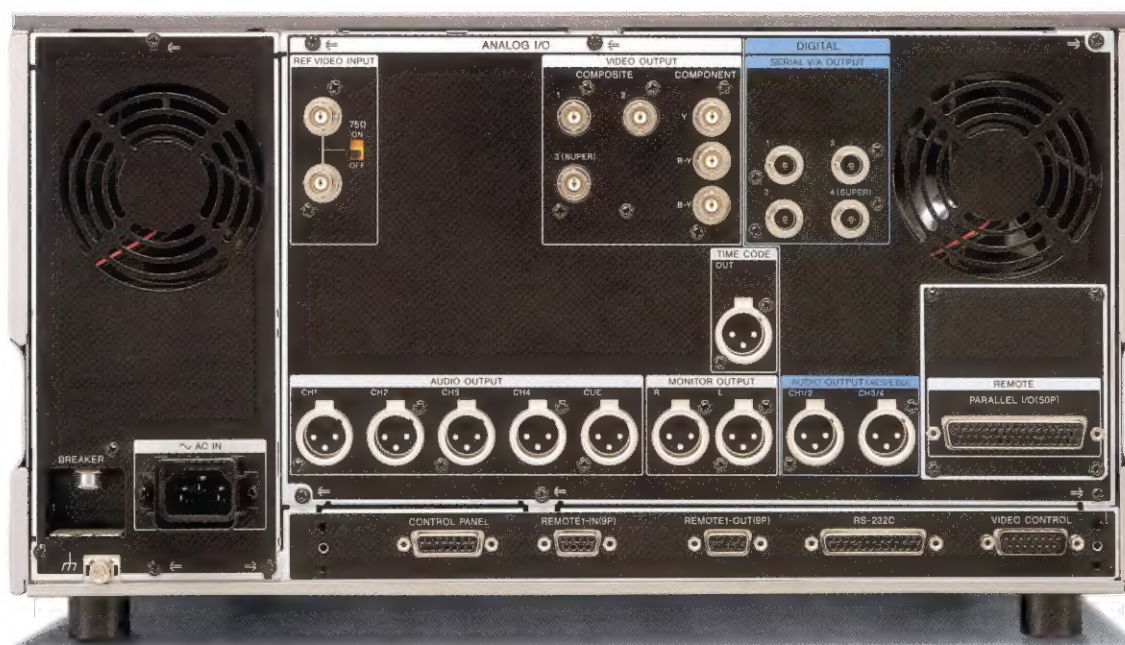
For customized applications, an optional BKDW-509 Parallel (50P) Interface Kit is available, which allows remote control of basic VTR functions through the 50-pin parallel communication port.

Video control

The DVW-A510 also has a 15-pin video control port through which the video processor can be adjusted from an optional BVR-50 Video Processor Controller.

Control panel

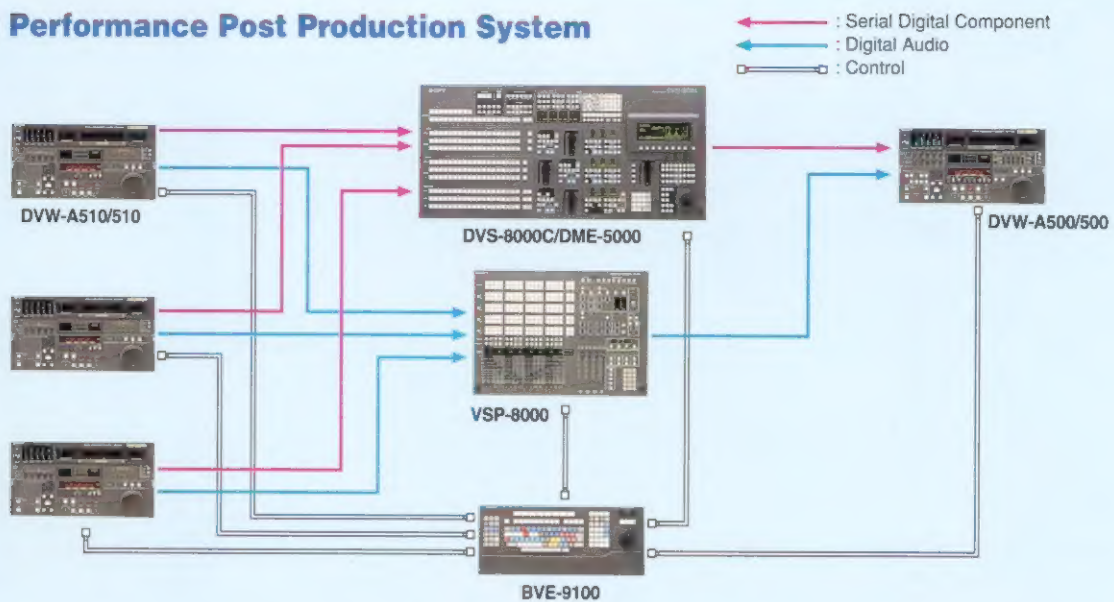
The control panel can be completely detached from the DVW-A510 and remote operation can be extended up to 10m with an optional BKDW-510 Control Panel Extension Kit and BKDW-511 Control Panel Case.



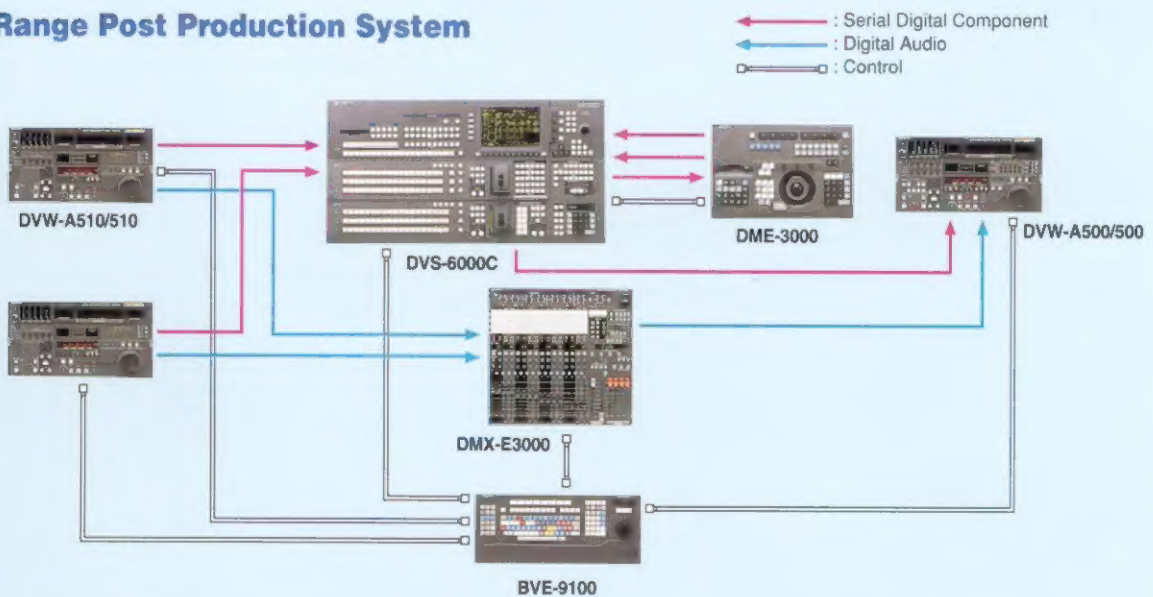
DVW-A510
*Parallel I/F is optional

System Configuration

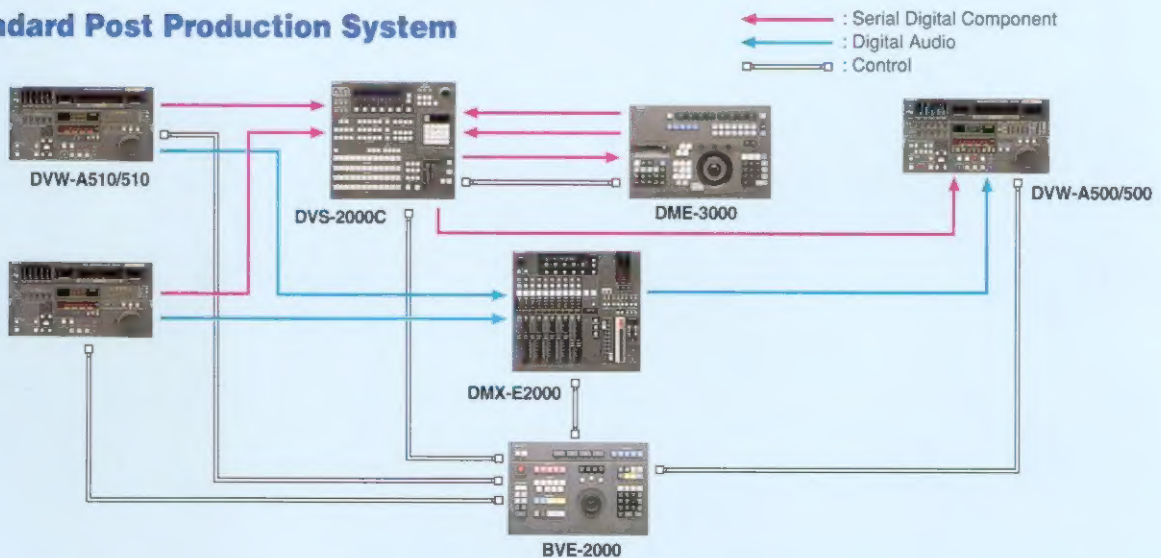
High Performance Post Production System



Mid-Range Post Production System



Standard Post Production System



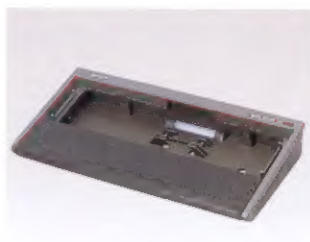
Optional Accessories



Parallel (50P) Interface Kit
BKDW-509



Control Panel Extension Kit
BKDW-510



Control Panel Case
BKDW-511



Video Processor Controller
BVR-50



Digital Rate Converter
DFX-1201



Digital Audio Delay Unit
DDU-2100



Digital Color Corrector
BVX-D10



Digital Video Interface Unit
PFV-D50/D100/D200

PFV-D50



Audio Converter Unit
DAF-2000A



Digital Audio Sampling Rate Converter
DFX-2400



Dynamic Motion Controller
DTR-3000



Digital 4:2:2 Input Kit
BKM-2085
(for BVM-1911/1912/1916/1311/1316)



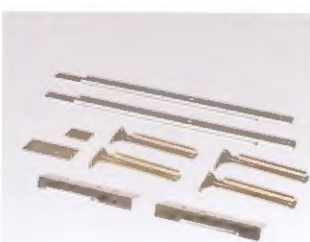
Digital Monitor Interface
DMIF-1000
(for PVM-1344Q/1944Q)



Digital Audio Cable
ECD-3C/10C/30C
(3m, 10m, 30m)



Remote Control Cable D-sub 9-pin
RCC-5G/10G/30G
(5m, 10m, 30m)



Rack Mount Kit
RMM-110



Digital Video Cassette
BCT-D6/D12/D22/D32/D40
(Small Cassette)
BCT-D34L/D64L/D94L/D124L
(Large Cassette)



Cleaning Cassette
BCT-5CLN

Audio Program Play Board
BKDW-507

Extension Board

Maintenance Manual (Part II)

Specifications

General

| | |
|---|--|
| Power requirements | AC 90V to 265V, 48Hz to 64Hz |
| Power consumption | 375VA (175W) |
| Operating temperature | +5°C to +40°C (41°F to +104°F) |
| Storage temperature | -20°C to +60°C (-4°F to +140°F) |
| Humidity | 25 to 80% (relative humidity) |
| Weight | 34kg(75lb) |
| Dimensions (WxHxD) (including feet) | 427 x 237 x 520mm(16 7/8 x 9 3/8 x 20 1/2 inches) |
| Recording format | Digital BETACAM |
| Tape speed | Digital BETACAM: 96.7mm/s Betacam playback: 118.6mm/s |
| Digital playback time | Max. 124 min with BCT-D124L cassette |
| Analog playback time | Max. 90 min with BCT-90MLA cassette |
| Recommended tape | Sony BCT-D6/D12/D22/D32/D40 (small cassette) BCT-D34L/D64L/D94L/D124L (large cassette) or equivalent Betacam/Betacam SP cassette |
| Fast forward/rewind time | Approx. 3 min with BCT-D124L cassette |
| Search speed (Shuttle mode) | Still to approx. ± 50 times normal playback speed |
| Dynamic tracking range (Variable mode) | -1 to +3 times normal playback speed |
| Servo lock time | 0.5s or less (from standby on) |
| Load/unload time | 6s or less |

Input/output signals

Video

| | |
|--------------------------|---|
| Reference | BNC (x1) with loop through 0.3Vp-p, 75 Ω |
| Output | |
| Serial digital interface | BNC (x4), SMPTE259M, 270 Mbits/s (including 1 character out) |
| Analog component | BNC (x1, Y/R-Y/B-Y) Y: 1.0Vp-p, 75 Ω R-Y/B-Y: 0.7Vp-p, 75 Ω |
| Analog composite | BNC (x3) 1.0Vp-p, 75 Ω (including 1 character out) |

Audio

| | |
|-------------------------|---|
| Output | |
| Digital | XLR 3-pin (CH 1/2, 3/4), AES/EBU format, stereo mode, balanced BNC (SDI, video & audio), SMPTE259M, 270Mbits/s |
| Analog | XLR 3-pin (CH 1,2,3,4,Cue) +4dBm at 600 Ω load, low impedance, balanced |
| Monitor L/R | XLR 3-pin, +4dBm at 600 Ω load, low impedance, balanced |
| Headphones | JM-60 stereo phone jack, ∞ to -12dBu at 8 Ω load, unbalanced |
| Time code | |
| Output | XLR 3-pin, 2.2Vp-p, low impedance, balanced |
| Remote | |
| Remote 1 in | D-sub 9-pin, RS-422A interface |
| Remote 1 out | D-sub 9-pin, RS-422A interface |
| RS-232C | D-sub 25-pin, RS-232C interface |
| Parallel I/O (Remote 2) | D-sub 50-pin, (with optional BKDW-509 Parallel (50P) Interface Kit) |
| Video control | D-sub 15pin, (for optional BVR-50 Remote Controller) |
| Control panel | 15-pin, (for optional BKDW-510 Control Panel Extension Kit) |

Processor adjustment range

| | |
|-------------------|---|
| Video level | ± 3 dB/ ∞ to +3dB selectable |
| Chroma level | ± 3 dB/ ∞ to +3dB selectable |
| Setup/Black level | ± 210 mV |
| Chroma phase/Hue | $\pm 30^\circ$ |
| System Sync phase | $\pm 15\mu$ s |
| System SC phase | ± 200 ns |
| Y/C delay | ± 100 ns |

Video/Audio performance

●Digital Video

| | |
|--------------------|--------------------------------|
| Sampling frequency | Y: 13.5MHz R-Y/B-Y: 6.75MHz |
| Quantization | 10 bits/sample |
| Error correction | Reed-Solomon code |
| Error concealment | Adaptive three dimensional |

Analog component output

| | |
|---------------------|--|
| Bandwidth | Y: 0 to 5.75MHz ± 0.5 dB R-Y/B-Y: 0 to 2.75MHz ± 0.5 dB |
| S/N ratio | 62dB or more |
| K-factor (2T pulse) | 1% or less |

Analog composite output

| | |
|---------------------|-----------------------------------|
| Bandwidth | Y: 0 to 5.75MHz $\pm 0.5/-0.7$ dB |
| S/N ratio | 58 dB or more |
| Differential gain | 2% or less |
| Differential phase | 2° or less |
| Y/C delay | 15ns or less |
| K-factor (2T pulse) | 1% or less |

●Digital Audio (DA 1 to DA 4 channels)

| | |
|---|------------------------------------|
| Sampling frequency | 48kHz (synchronized with video) |
| Quantization | 20 bits/sample |
| Analog output D/A quantization | 18 bits/sample |
| Frequency response (0dB at 1kHz) | 20Hz to 20kHz, ± 0.5 dB/-1.0dB |
| Dynamic range (at 1kHz, emphasis ON) | More than 95dB |
| Distortion (at 1kHz, emphasis ON, reference level) | Less than 0.05% |
| Cross talk (at 1kHz, between any two channels) | Less than -80dB |
| Wow & flutter | |
| T1 = 50 μ s, T2 = 15 μ s | |

●Analog Audio (Cue track)

| | |
|--|---------------------------|
| Frequency response | 100Hz to 12kHz ± 3 dB |
| S/N ratio (at 3% distortion level) | More than 45dB |
| Distortion (T.H.D at 1kHz reference level) | Less than 2% |
| Wow & flutter | Less than 0.2% rms |

* Reference level: +4dBm

Video/Audio performance for Betacam SP playback

| ●Video | Metal | Oxide |
|------------------|---------------------------------------|---------------------------------------|
| Bandwidth | | |
| Y | 30Hz to 4.5MHz ± 0.5 dB/-3.0dB | 30Hz to 4.1MHz ± 0.5 dB/-6.0dB |
| R-Y/B-Y | 30Hz to 1.5MHz ± 0.5 dB/-3.0dB | 30Hz to 1.5MHz ± 0.5 dB/-3.0dB |
| S/N ratio | | |
| Y | 51dB or more | 48dB or more |
| R-Y/B-Y | 48dB or more | 45dB or more |
| K-factor | 2% or less | 3% or less |
| LF non-linearity | | |
| Y | | 3% or less |
| R-Y/B-Y | | 4% or less |
| Y/C delay | 20ns or less | |

| ●Audio | Metal | Oxide |
|---|--------------------------------------|----------------------------------|
| AFM | | |
| Frequency response (at reference level) | 20Hz to 20kHz ± 0.5 dB/-2.0dB | — |
| S/N ratio (at 3% distortion level) | More than 85dB | — |
| Distortion (T.H.D at 1kHz reference level) | Less than 0.5% | — |
| Longitudinal | | |
| Frequency response (at 10dB below reference level) | 50Hz to 15kHz ± 1.0 dB/-2.0dB | 50Hz to 15kHz ± 3.0 dB |
| S/N ratio (at 3% distortion level) | More than 72dB | More than 50dB (Dolby NR OFF) |
| Distortion (T.H.D at 1kHz reference level) | Less than 1% | Less than 2% |
| Wow & flutter | Less than 0.1% | |

*Reference level: +4dBm

Supplied accessories

| | |
|-------------------------------------|-----|
| AC power code | (1) |
| RCC-5G 9-pin remote control cable | (1) |
| PSW 4 x 16 screws for rack mounting | (4) |
| Operation manual | (1) |
| Installation manual | (1) |
| Maintenance manual (Part I) | (1) |

ISR (Interactive Status Reporting) is an equipment management system developed by Sony Corporation.

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